



Benchmarking Study of TDOT D Mixtures for Balanced Mixed Design

Problem Description

Like many owner agencies, the Tennessee Department of Transportation (TDOT) is interested in ways to facilitate the increased durability of asphalt mixes to make its roadway network more sustainable, longer lasting, and more economical. The balanced mix design (BMD) method proposes to address this by incorporating performance criteria into mix design and acceptance. TDOT has committed to implementing the BMD method to improve asphalt mix performance. This process will require replacing the prescriptive specifications currently in place. TDOT currently utilizes the Marshall Hammer for Asphalt Mix Design. However, all nationally developed performance tests were designed around the Superpave Gyratory Compactor (SGC). TDOT has two proposed tests that could be used theoretically to stand in for the national tests while utilizing Marshall samples. Implementing a new procedure for asphalt mix design is a critical step for the quality of Tennessee asphalt mixtures and requires high-quality data.

PROJECT NUMBER:

RES2024-07

PRINCIPAL INVESTIGATOR:

Dr. Baoshan Huang
University of TN - Knoxville

TDOT LEAD STAFF:

Derek Gaw
Materials & Tests Division

PROJECT SCHEDULE:

August 2023 to July 2025

Research Objectives

The objectives of this research are:

- To benchmark currently produced D mixes in Tennessee against the IDEAL-CT, TN-CT, Hamburg Wheel Tracking Test (HWTT), and Hot Indirect Tensile Strength.
- Develop a practical method for asphalt mixture short and long-term aging.
- Correlate the performance results of the samples compacted with Marshall Compactor and SGC.
- Recommend specification limits for different performance tests.

Potential Implementation and Expected Benefits

Local calibration is a necessary step in determining appropriate specification limits. This research will allow TDOT to understand what realistic values can be achieved with our locally available materials. This study will also inform producers where their current mixes fall in relation to proposed specifications and assist in achieving buy-in for the change. This research will also create a database of in-place surface mixtures for TDOT to monitor the life of the mixture and be used to make data-driven decisions for potential mixture related specification changes. Additionally, the results from the TN-CT and Hot IDT tests will be compared to the IDEAL-CT and HWTT tests (respectively), and correlations drawn may allow TDOT to utilize a test based around the Marshall Hammer rather than conversion to SGC. Alternatively, a lack of correlation would be used to prove that conversion to the SGC is necessary and will help justify producers forced purchase of that equipment. Having this information is critical for the further implementation of BMD in Tennessee.